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Bryophytes of Sete Cidades National Park, Piauí, Brazil

Géssica Maria Gomes do Nascimento[1], Gonçalo Mendes da Conceição[1], Denilson Fernandes Peralta[2], Hermeson Cassiano de Oliveira[1,3]

1 Programa de Pós-Graduação em Biodiversidade, Ambiente e Saúde, Universidade Estadual do Maranhão, Praça Duque de Caxias, Morro do Alecrim, s/n, 65055-310, Caxias, Maranhão, Brazil. **2** Instituto de Botânica de São Paulo, Av. Miguel Stéfano, 3687, 04301-012, São Paulo, São Paulo, Brazil. **3** Universidade Estadual do Piauí, Campus Heróis do Jenipapo, Av. Sto. Antônio, s/n, 64280-000, Campo Maior, Piauí, Brazil.
Corresponding author: Géssica Maria Gomes do Nascimento, gessica.nbio@gmail.com

Abstract
Sete Cidades National Park is located in northeastern Piauí State, Brazil, and comprises several vegetation types characteristic of the Brazilian Cerrado. This study contributes to understanding the composition and distribution of Brazilian bryoflora and provides a list of bryophytes of Sete Cidades National Park. A total of 520 samples representing 90 species were collected, of which 53 represent new occurrences for Piauí, 25 for the Cerrado and four for the Northeast Region of Brazil. About 55% of the species have broad distributions in the country. This study highlights the relevance of Sete Cidades National Park for the conservation of species and the importance of continued bryofloristic studies in Piauí.

Keywords
Bryophyta, Marchantiophyta, Cerrado.

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Introduction

The conservation of biodiversity represents one of the major challenges facing today's society due to the high level of anthropic disturbances of natural ecosystems (Viana and Pinheiro 1998). In this context, conservation units represent important instruments for the conservation of biological diversity.

The state of Piauí is in an area of ecological tension with transitional or ecotonal vegetation (IBGE 1992) being influenced by three phytogeographical domains—Amazon Forest, Cerrado, and Caatinga (Rizzini 1963; Andrade 1968)—along with transitional areas of Forest/Cerrado and Caatinga/Cerrado (CODEVASF 2006). These conditions are reflected in spatial heterogeneity that provides a great variety of microhabitats for the establishment of bryophytes.

The bryoflora of Brazil comprises approximately 1567 species (15 hornworts, 668 liverworts, and 994 mosses), while 48 species are known from the state of Piauí (Flora do Brasil 2020).

Despite advances brought by bryofloristic studies in the Brazilian Northeast, Piauí remains a poorly studied state. The first record of bryophytes for the state was that of Lützelburg (1922), who cited 11 species of mosses belonging to five families. This was followed by the work of Castro et al. (2002), who recorded 22 species of mosses for Sete Cidades National Park, and Yano et al. (2009),

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who cited 40 species for the state. Some additional information was provided by sparse and sporadic collections in some locations of the state and compiled in the catalogs by Yano (1981, 1984, 1989, 1995, 2005, 2006) and more recently by Nascimento et al. (2019), who cited 62 species from Serra da Capivara National Park.

The location and importance of Sete Cidades National Park as a conservation unit in Piauí is even more evident because it is within the Cerrado, which is recognized as a global biodiversity hotspot (Mittermeier et al. 2004) and justifies the need for studies that aim to help conserve of this phytogeographical domain. So, the aim of our study was to survey and verify the species richness of the bryoflora of Sete Cidades National, to record the occurrence of species among Brazilian phytogeographical domains, and to better determine the geographic distribution of species.

Methods

Study area. Sete Cidades National Park (PN7C, Fig. 1) is in a chain of rocky outcrops in northwestern Piauí state, centered at approximately 04°05′15″S, 041°30′45″W and encompassing the municipalities of Brasileira and Piracuruca (Afonso et al. 2008). The mean annual temperature and precipitation for PN7C are 26.8 °C and 1,200 mm, respectively, and the climate is subhumid. The relief ranges from 100 to 300 m (IBDF 1979). The predominant biome is the Cerrado, which comprises various vegetation formations such as patches of cerradão, open flood plains, and riparian forests. PN7C is inserted in a region designated as a priority for the conservation of Cerrado biodiversity (IBAMA 1989). According to Velloso et al. (2001), it is inserted in an area of ecological tension between the Caatinga and Cerrado, as a part of the Campo Maior vegetation complex (Figs 2–7).

Sampling, herborization, and identification. We conducted five field excursions between December 2016 and June 2017. Each excursion lasted two consecutive days with a daily walking time of eight hours per day. Collection, herborization, and preservation of material followed Gradstein et al. (2001). Random walks were performed, on pre-existing trails or off trail, while collecting samples from all available substrates. Our methods were similar to the "walking" method described by Filgueiras et al. (1994). Substrates were classified based on Fudali (2001).

We identified the samples and incorporated them into the Herbarium da Universidade Estadual do Piauí (HUESPI), Campus Heróis do Jenipapo. Duplicates were incorporated in the Herbarium "Maria Eneyda Pacheco Kauffman Fidalgo" (SP) at the Instituto de Botânica de São Paulo.

Species identifications followed Sharp et al. (1994), Yano and Carvalho (1995), Buck (1998), Bôas-Bastos and Bastos (1998), Bastos et al. (2000), Gradstein et al. (2001), Gradstein and Costa (2003), Bastos (2007), Valente et al. (2011), and Bordin and Yano (2013), and comparisons were made with herbarium specimens. The classification system used is that of Crandall-Stotler et al. (2009) for Marchantiophyta and Goffinet et al. (2009) for Bryophyta. Species presence in Brazilian states follow the Flora do Brasil (2020), complemented by information by Yano (2011).

Brazilian geographical distributions were categorized according to Valente and Pôrto (2006), who considered bryophytes that occur in one to four Brazilian states as restricted; those occurring in five to nine states as moderately distributed, and those occurring in 10 or more Brazilian states as broadly distributed. Also used were the Flora do Brasil (2020), complemented by the works of Gradstein and Costa (2003) and Costa and Peralta (2015).

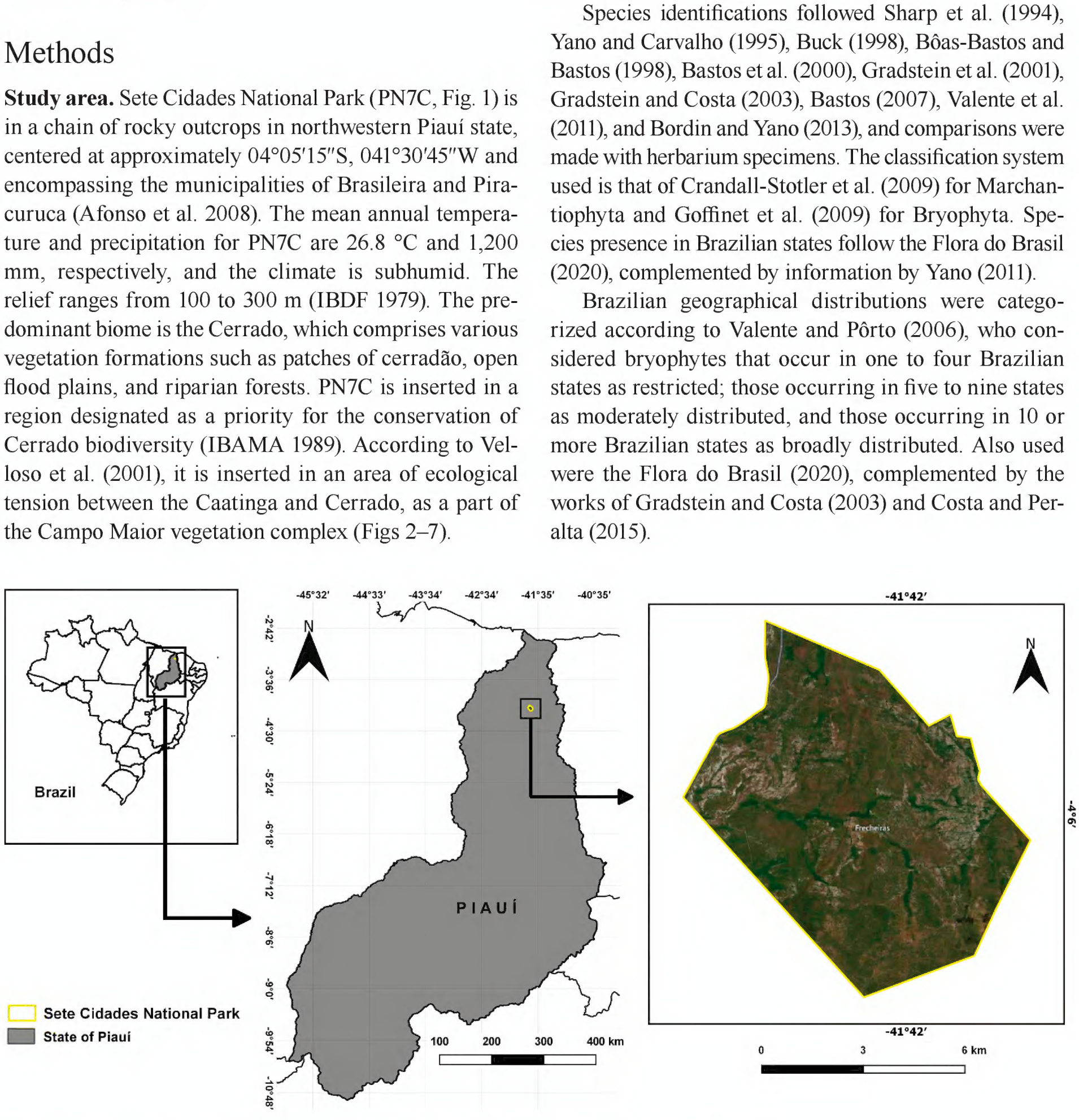


Figure 1. Geographic location of the Sete Cidades National Park (PN7C) in Brazil and the state of Piauí.

Figures 2–7. Study area. **2, 3.** PN7C overview. **4, 5.** Streams. **6, 7.** Rupestrian fields.

Results

A total of 520 samples were analyzed, which belong to 90 species, 43 genera, and 23 families. Of these species, 63 species are mosses (Bryophyta) belonging to 25 genera in 12 families, and 27 species are liverworts (Marchantiophyta) belonging to 18 genera in 11 families. The list includes newly recorded species, including 25 in the Cerrado, 53 in Piauí state, and four in the Northeast Region of Brazil.

Mosses were predominant in terms of species richness, with the richest family being Fissidentaceae, with

20 species, followed by Bryaceae with nine and Leucobryaceae with eight species. The richest hepatic family was Lejeuneaceae, with 14 species, followed by Ricciaceae with four species.

Approximately 55% (n = 50) of the species have broad distributions in Brazil, while 31% (n = 29) have moderate distributions, and 14% (n = 13) are restricted. Among the restricted species, 10 are mosses and three are liverworts).

The predominant communities categorized by colonized substrate was the saxicolous species (64 spp.), followed by terricolous (30 spp.), corticolous (18 spp.), and epixylous (6 ssp.).

We provide, in alphabetical order by family, brief characterizations of the 90 species found in PN7C. Remarkable species and those newly recorded from the biome, state, or region, are figured by photographs (Figs 8–32). Species that are newly recorded from the state of Piauí are marked by an asterisk (*); those species with two asterisks (**) are newly recorded from the Northeast Region.

Bryophyta
Family Archidiaceae Schimp.

***Archidium ohioense* Schimp. ex Müll. Hal.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Trilha Bacuri; 04° 05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1049) • 2 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 643, 642) • 4 specimens; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 656, 1255, 1318, 1643) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1642) • 1 specimen; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 29 Mar. 2017; G.M.G Nascimento leg. (HUESPI 657) • 2 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 943, 1115) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 647) • 1 specimen; III Cidade; 04°05′95″S, 041°41′51″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1244) • 1 specimen; IV Cidade; 04°06′14″S, 041°41′60″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1322).

Identification. Gametophyte with 1–3 branches; leaves lanceolate to ovate-lanceolate; median cells narrowly rhomboid, with basal rectangular to short-rectangular, quadratic in the alar region. Briocenological group: corticolous and terricolous.

Brazilian range. AL, BA, CE, GO, MG, MS, MT, PB, PI, PR, RN, RS, SC, SE, SP (broadly distributed).

Family Bartramiaceae Schwägr.

***Philonotis cernua* (Wils.) Griffin & W.R. Buck**

New records. BRAZIL • 23 specimens; Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 19 Feb. 2017; G.M.G Nascimento leg. (HUESPI 395, 397, 407, 408, 411, 416, 423, 434, 435, 436, 437, 442, 444, 445, 446, 449, 450, 466, 475, 477, 485, 514, 524) • 2 specimens; I Cidade; 04°05′70″S, 041° 40′80″; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 753, 739).

Identification. Leaves narrow-lanceolate, with acuminate and denticulate apex; distal papillae clear; base cells long-rectangular, denticulate margin with row of simple cells; costa excurrent. Briocenological group: saxicolous.

Brazilian range. CE, DF, GO, MA, MG, MT, PB, PR, RJ, RS, SC, SE, SP (broadly distributed).

***Philonotis elongata* (Dism.) H.A. Crum & Steere**
Figure 8

New records. BRAZIL • 1 specimen; Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Jul. 2017; G.M.G Nascimento leg. (HUESPI 527).

Identification. Leaves spirally arranged, oblong-lanceolate; apex erect, acuminate; margin denticulate to delicately serrated. Briocenological group: saxicolous.

Brazilian range. AM, BA, CE, MG, MT, PB, PE, PR, SP (moderately distributed).

***Philonotis hastata* (Duby) Wijk & Marg.**

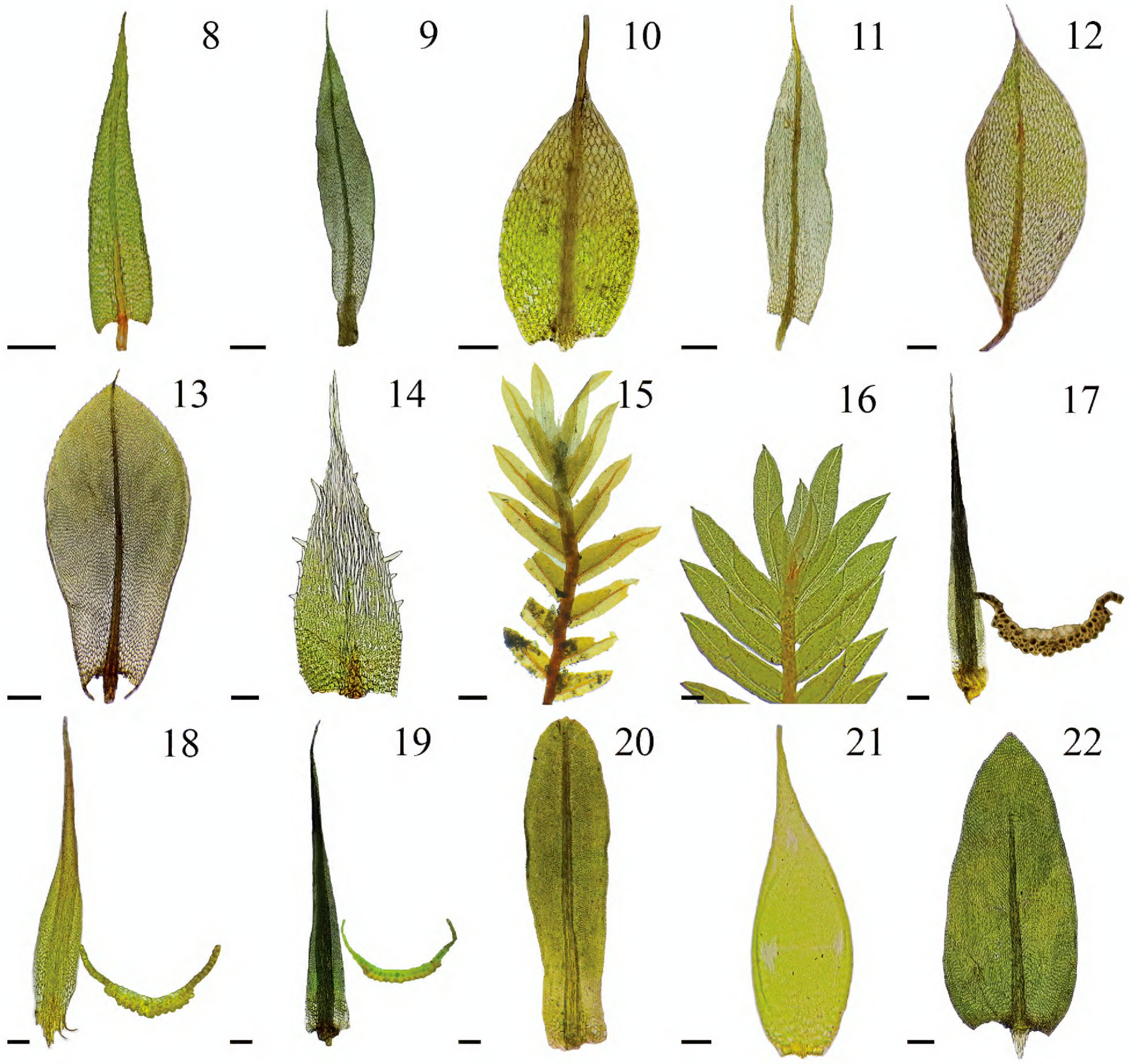
Examined material. BRAZIL • 5 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 395, 447, 481, 483, 484) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 947) • 1 specimen; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 747) • 1 specimen; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1332).

Identification. Leaves lanceolate to oblong-lanceolate, apex acute to long-acuminate; serrated margin, double, usually formed by paired or simple cells close to base and apex; costa simple, subpercurrent to percurrent; lamina cells rectangular to subrectangular. Briocenological group: saxicolous.

Brazilian range. AM, BA, CE, GO, MA, MG, MS, MT, PA, PI, PR, RJ, RO, RS, SP (broadly distributed).

***Philonotis uncinata* (Schwägr.) Brid.**

Examined material. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 949, 1733) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1166) • 1 specimen; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 447) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 967) • 1 specimen; V Cidade; 04°



Figures 8–22. Bryophytes of Sete Cidades. **8.** *Philonotis elongata* (Dism.) H.A. Crum & Steere. **9.** *Brachymenium columbicum* (De Not.) Broth. **10.** *Bryum atenense* R.S. Williams. **11.** *Bryum coronatum* Schwägr. **12.** *Plagiobryum cellulare* Hook. ex Schwägr. **13.** *Rosulabryum billarderi* (Schwägr.) Spence. **14.** *Fabronia macroblepharis* Schwägr. **15.** *Fissidens prionodes* Mont. **16.** *Fissidens weirii* Mitt. **17.** *Campylopus fragilis* (Brid.) Bruch & Schimp. **18.** *Campylopus julicaulis* Broth. **19.** *Campylopus pilifer* Brid. **20.** *Plaubelia sprengelii* (Schwägr.) R.H. Zander. **21.** *Vitalia galipense* (Müll. Hal.) Mitt. **22.** *Stereophyllum radiculosum* (Hook.) Mitt.

06′016″S, 041°41′68″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1072).

Identification. Leaves curved leaves when dry, erect when moist, ovate-lanceolate; apex acuminate to long-acuminate; margin entire, simple, formed by a row of cells; costa simple, subpercurrent to excurrent, lamina cells short-rectangular to rectangular. Briocenological group: saxicolous.

Brazilian range. AC, AM, AP, BA, CE, DF, ES, GO, MG, MS, MT, PA, PB, PE, PI, RJ, RO, SP, TO (broadly distributed).

Family Bryaceae Schwägr.

***Brachymenium columbicum* (De Not.) Broth.**
Figure 9

New records. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 303, 305) • 2 specimens; VI Cidade; 04°06′14″S, 041°41′60″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 975, 992).

Identification. Leaves oblong-lanceolate, equally distributed along branch, erect to imbricate when dry, with denticulate margin of the upper median portion. Briocenological group: saxicolous, terricolous, and epixylous.

Brazilian range. CE, SP (restricted distribution). Newly recorded from the Cerrado.

***Brachymenium fabronioides* (Müll. Hal.) Kindb.**

New records. BRAZIL • 1 specimen; Piauí, Piracu-

ruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 333).

Identification. Leaves shiny, with linear margin cells. Briocenological group: saxicolous.

Brazilian range. BA, ES (restricted distribution). Newly recorded from the Cerrado.

***Bryum apiculatum* Schwägr.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, VI Cidade; 04°05′ 83″S, 04°41′25″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 325) • 1 specimen; Cachoeira Riachão 04°27′ 40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento (HUESPI 993).

Identification. Leaves erect to erect-expanded; apex acute; costa short, excurrent, forming a small apiculus. Briocenological group: saxicolous.

Brazilian range. AC, CE, DF, GO, MG, MS, PA, PR, RJ, SC, SP (broadly distributed).

***Bryum atenense* R.S. Williams**

Figure 10

New records. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1034, 1069).

Identification. Leaves ligulate-lanceolate, equally distributed along the branch; apex acuminate; cells long-hexagonal; margin entire costa long, excurrent. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, DF, MS, PE, RJ, RR, SP (moderately distributed and endemic). Newly recorded from the Cerrado.

***Bryum coronatum* Schwägr.**

Figure 11

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 979).

Identification. Leaves plane lanceolate, with acuminate apex; lamina cells rectangular-fusiform; costa percurrent. Briocenological group: saxicolous.

Brazilian range. AL, DF, GO, MG, MS, MT, PB, PE, RJ, RO, SE, SP, TO (broadly distributed).

***Bryum leptocladon* Sull.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 510).

Identification. Lamina cells rhomboidal-hexagonal; capsules small; spores smooth. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, CE, DF, GO (restricted distribution).

***Plagiobryum capillare* Hedw.**

Examined material. BRAZIL • 5 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 468, 500, 503, 510, 1049) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 957) • 3 specimens; II Cidade; 04°05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 326, 328, 331) • 1 specimen; Circuito das Águas; 04°05′39″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 525) • 1 specimen; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 312) • 1 specimen; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 996).

Identification. Very common; growing in tufts or patches, with stems mostly 1–3 cm tall. Dry plants usually with corkscrew-like shoots, with leaves spirally twisted around stem. In some populations, the dry shoots have leaves that are straight or only slightly twisted. Briocenological group: saxicolous.

Brazilian range. AM, BA, CE, ES, MG, PA, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SP (broadly distributed).

***Plagiobryum cellulare* Hook.**

Figure 12

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, VI Cidade 04°06′14″S, 041° 41′60″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 287).

Identification. Leaves oblong-obovate, profoundly concave; cells large, little differentiated at margins; capsules ovoid. Briocenological group: saxicolous.

Brazilian range. CE, MG, RS (restricted distribution). Newly recorded from the Cerrado.

***Rosulabryum billarderi* (Schwägr.) J.R. Spence**

Figure 13

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, VI Cidade 04°06′14″S, 041°41′60″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 990).

Identification. Gametophyte light brown to dark green, robust, erect. Leaves scattered at base of branch and rosulate tufts at apex; tomentose papillose present, with cell divisions concentrated at base of branch; leaves ovoid. Briocenological group: saxicolous and terricolous.

Brazilian range. AM, BA, DF, ES, GO, MA, MG, MS, MT, PA, PE, PR, RJ, RO, RR, RS, SC, SP (broadly distributed).

Family Calymperaceae Kindb.

***Calymperes palisotii* Schwägr.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Trilha Bacuri;

04°05′94″S, 041°42′58″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1340).

Identification. Cancelline forming a very wide angle distally with costa. Gemmae in tufts at apex of costa. Briocenological group: corticolous and saxicolous.

Brazilian range. AL, AM, AP, BA, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RR, SE, SP, TO (broadly distributed).

***Octoblepharum albidum* Hedw.**

Examined material. BRAZIL • 3 specimens; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 19 Dec. 2016; G.M.G Nascimento leg. (HUESPI 255, 256, 257) • 3 specimens; same locality; 3 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1132, 1147, 1706) • 3 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1148, 1159, 1408) • 1 specimen; III Cidade; 04°05′95″S, 041°41′51″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1151) • 1 specimen; IV Cidade; 04°06′14″S, 041°41′60″W; 19 Dec. 2016; G.M.G Nascimento leg. (HUESPI 1331) • 1 specimen; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1507) • 2 specimens; same locality; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1313, 1338) • 3 specimens; Circuito das Águas; 04°05′39″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1059, 1137, 1149) • 2 specimens; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1136, 1154) • 3 specimens; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 934, 1135, 1153).

Identification. Gametophytes usually whitish-green; leaves apex apiculate, with small denticles; sporophyte usually present; setae 10 mm long; capsule ovoid. Briocenological group: terricolous.

Brazilian range. AC, AL, AM, AP, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RN, RO, RR, RS, SC, SE, SP, TO (broadly distributed).

***Octoblepharum cylindricum* Mont.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1656).

Identification. Plants firm and resistant when dry, fragile in herbarium, whitish to light yellow, rarely branched, sometimes with pink or purple at te bases of leaves; leaves curved, ligulate; apex apiculate. Briocenological group: corticolous.

Brazilian range. AM, AP, BA, CE, DF, GO, MG, MS, MT, PA, PB, PI, RO, RR, SP, TO (broadly distributed).

****Octoblepharum pulvinatum* (Dozy & Molk.) Mitt.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 541) • 1 specimen; Circuito das Águas; 04°05′39″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1006).

Identification. Apex of leaves obtuse; costa with constriction in transverse section of base of leaves. Briocenological group: saxicolous.

Brazilian range. AC, AL, AM, AP, BA, CE, ES, GO, MA, MG, MS, MT, PA, PE, RJ, RO, RR, SC, SP, TO (broadly distributed). Newly recorded from the Cerrado.

***Syrrhopodon prolifer* Schwägr.**

Examined material. BRAZIL • 3 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 8 Jun. 2016; G.M.G Nascimento leg. (HUESPI 1156, 1343, 1713).

Identification. Leaves lanceolate, bordered at base; cancellinae very distinct; pluripapillary cells dense. Briocenological group: saxicolous.

Brazilian range. AC, AL, AM, AP, BA, CE, DF, ES, GO, MG, MT, PA, PE, PI, PR, RJ, RO, RS, SC, SE, SP, TO (broadly distributed).

Family Fabroniaceae Schimp.

****Fabronia macroblepharis* Schwägr.**

Figure 14

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, I Cidade; 04°05′67″S, 041° 40′80″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1140).

Identification. Leaves oblong-lanceolate, with small, irregular teeth on margin. Briocenological group: corticolous and saxicolous.

Brazilian range. AM, AL, BA, CE, DF, ES, GO, MG, MS, MT, PB, PE, PR, RJ, RS, SC, SE, SP (broadly distributed).

Family Fissidentaceae Schimp.

***Fissidens angustifolius* Sull.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Trilha Bacuri; 04° 05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1441) • 2 specimens; same locality; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1479, 1506).

Identification. Leaves narrow, with margin entire and limbid running along whole length of lamina; cells unipapillose. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AM, BA, CE, GO, MA, PA, PB, PE, PI, RJ, RO, RS, SP (broadly distributed).

****Fissidens bryoides* Hedw.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 368) • 1 specimen; same locality; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 492).

Identification. Hyaline axillary nodules in stem absent; leaves with unistratose limbidium, not confluent with costa. *Fissidens bryoides* resembles *F. crispus* Mont. by the format of the leaves and limbidium, but the presence of hyaline axillary nodules and large cells in *F. crispus* differentiates these species. Briocenological group: saxicolous and terricolous.

Brazilian range. PE, PR, SP (restricted distribution). Newly recorded from the Cerrado.

***Fissidens dissitifolius* Sull.**

New records. BRAZIL • 4 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Feb. 2017; G.M.G Nascimento leg. (HUESPI 491, 494, 505, 506) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1061).

Identification. Gametophytes small (2–4 mm high), flabellate; leaves generally crispate when dry, with limbidium throughout lamina usually ending before apex. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, PR, SP (restricted distribution). Newly recorded from the Cerrado.

***Fissidens flaccidus* Mitt.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Feb. 2017; G.M.G Nascimento leg. (HUESPI 332).

Identification. Gametophytes flabellate; leaves long, lanceolate with entire limbidium confluent with apex; pentagonal or hexagonal cells smooth, with sinuous walls. This species is similar to *Fissidens palmatus* Hedw. but smaller (generally 2–4 mm high) and having cells with straight walls and the limbidium not confluent with the apex. Briocenological group: saxicolous.

Brazilian range. AC, AM, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PR, RJ, RO, RS, SE, SP, TO (broadly distributed).

***Fissidens goyazensis* Broth.**

Examined material. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Trilha Bacuri; 04°05′94″S, 041°42′58″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 643, 1483) • 3 specimens; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 948, 1494, 1650) • 2 specimens; IV Cidade; 04°06′14″S, 041°41′60″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1372, 1440) • 2 specimens; V Cidade; 04°06′016″S, 041°41′607″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1033, 1369).

Identification. Leaves distant to imbricate, oblong-lanceolate to linear-lanceolate; apex acute to acuminate, margin entire; limbidium across lamina, 1–4 cells wide, confluent with apex or ending 6–8 cells below; costa bryoides-like, strong, yellowish, percurrent or excurrent. Briocenological group: saxicolous and terricolous.

Brazilian range. AM, BA, CE, DF, GO, MG, PB, PE, PI, RJ, SP (broadly distributed).

***Fissidens guianensis* Mont.**

Examined material. BRAZIL • 3 specimens; Piauí, Piracuruca, Sete Cidades National Park, Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1465, 1471, 1477).

Identification. Leaves contiguous to distant; apex obtuse to rounded or broadly acute to apiculate; margin crenulated to serrated; limbidium at base of vaginant lamina; costa with 2–4 linear cells, bryoid-like, strong, yellowish to reddish, up to 1–4 cells below apex. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AM, ES, MG, MS, MT, PA, RO, RR, SP, TO (broadly distributed).

***Fissidens hornschuchi* Mont.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, I Cidade; 04°05′70″S, 041°40′80″; 19 Dec. 2016; G.M.G Nascimento leg. (HUESPI 1466) • 1 specimen; same locality; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1439) • 2 specimens; II Cidade; 04°05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1486, 1711) • 1 specimen; same locality; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1719).

Identification. Leaves distant to contiguous laves, oblong-lanceolate to oblong-oval; acute apex; margin crenulated to serrated, with papillose projection across leaf, smooth on part of vaginant lamina; limbidium at middle region or up to middle of vaginant lamina; costa strong and reddish. Briocenological group: saxicolous and terricolous.

Brazilian range. AM, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, RJ, RO, RS, SC, SP (broadly distributed).

***Fissidens lagenarius* Mitt.**

Examined material. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1449, 1555) • 1 specimen; III Cidade; 04°05′95″S, 041°41′51″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1374) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1499) • 1 specimen; VI Cidade; 04°05′83″S, 04°41′25″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1614).

Identification. Leaves contiguous to imbricate, oblong to oblong-oval; apex acute to largely acute but sometimes apiculate; margin crenulated to slightly serrated; limbidium restricted to vaginant lamina of periquecial leaves, 1–3 cells, sometimes inconspicuous; costa bryoid-like, strong, percurrent or ending 4 or 5 cells below apex. Briocenological group: saxicolous and terricolous.

Brazilian range. CE, DF, ES, GO, MA, MG, MS, MT, PB, PE, PI, PR, RJ, RS, SC, SP (broadly distributed).

***Fissidens leptophyllus* Mont.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 19 Dec. 2016; G.M.G Nascimento leg. (HUESPI 354) • 1 specimen; same locality; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 621).

Identification. Leaves oblong-ovoid, with apex broadly acute; costa up to 2–4 cells below apex; unipapillose cells and limbidium in vaginate lamina of all leaves. This species is easily confused with *F. submarginatus* Bruch, but it has long oblong leaves and the limbidium occupies the entire extent of the vaginate lamina. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AM, BA, GO, MA, MG, SP (moderate distribution).

***Fissidens pallidinervis* Mitt.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1449).

Identification. Characterized by contiguous to imbricate leaves, oblong to oblong-lanceolate, obtuse or broadly acute apex, crenulate to serrated margin; limbidium present in the periquecial leaves, 1–3 cells wide, marginal or intramarginal; costa strong, percurrent or ending 4–12 cells below the apex. Briocenological group: saxicolous.

Brazilian range. AC, AL, AM, BA, CE, DF, GO, MA, MS, MT, PA, PE, PI, PR, RR, RS (broadly distributed).

***Fissidens palmatus* Hedw.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041° 41′69″W; 2 Fev. 2017; G.M.G Nascimento leg. (HUESPI 316).

Identification. Lamina of leaves with non-sinuous walls and differentiated median cells. This species is similar to *F. flaccidus* but with diagonally arranged cells with respect to the costa and the clavate gemmae absent on the stem. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, BA, CE, GO, MA, PB, PE, SP (moderate distribution).

***Fissidens perfalcatus* Broth.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 315).

Identification. Leaves oblong-ovoid, with vaginate lamina covering all of stem and usually surpassing it; limbidum occupying entire extension or up to vaginate lamina on all leaves and unipapillose cells. *Fissidens perfalcatus* differs from *F. submarginatus*, which possesses oblong-lanceolate leaves, a vaginate lamina covering part of the stem and never surpassing it, and a limbidium occupying the full extent of the vaginate lamina. Briocenological group: saxicolous and terricolous.

Brazilian range. TO, BA, PB, PE, GO, MT, ES (moderate distribution).

****Fissidens prionodes* Mont.**

Figure 15

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′ 40″S, 041°56′30″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 335).

Identification. Leaves with acute apices costa excurrent; cells rounded to hexagonal; margin irregular, inflated, unipapillose, crenulate. This species differs from *Fissidens allionii* Broth. in possessing leaves with a broader precurent costa and sporophytes on lateral branches. Briocenological group: termitocolous.

Brazilian range. AC, AM, MG, PA, RO, RR (moderate distributed). Newly recorded from the Cerrado.

***Fissidens radicans* Mont.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041° 41′69″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1025).

Identification. Leaves caducous, elimbate, oblong-ligulate, with apex obtuse. This species is similar to *Fissidens asplenioides* Hedw. in the shape of the leaves and cells, but it possesses generally larger gametophytes and longer leaves. Briocenological group: saxicolous.

Brazilian range. BA, DF, ES, PA, MA, MG, PB, SE, SP (moderate distribution).

***Fissidens steerei* Grout**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1010) • 2 specimens; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1058, 1521) • 2 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1315, 1674) • 2 specimens; I Cidade; 04°05′70″S, 041°40′80″; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1058, 1727) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 6 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1159) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1159) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1705) • 2 specimens; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1475, 1611).

Identification. Gametophytes delicate; leaves elimbate, with strongly obtuse apex. This species can be confused with *Fissidens serratus* Müll. Hal., but that species has a strongly serrated leaf margins and leaves with gradually acute apexes. Briocenological group: saxicolous.

Brazilian range. GO, PI, SP (restricted distribution).

***Fissidens submarginatus* Bruch in Krauss**

Examined material. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1376, 1459) • 1 specimen; I Cidade; 04°05′70″S, 041°40′80″; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1447) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1492) • 1 specimen; V Cidade; 04°06′016″S, 041°41′607″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1594).

Identification. Leaves contiguous to distant, oblong; apex acute to obtuse; margin crenulated to serrated; limbidium in vaginant lamina of all leaves; costa bryoid-like, strong, excurrent, percurrent or up to 1–3 cells below apex. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AM, BA, CE, DF, ES, GO, MA, MG, MT, PA, PB, PE, PI, RJ, RO, RS, SC, SP (broadly distributed).

****Fissidens weirii* Mitt.**

Figure 16

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 928).

Identification. Leaves entirely limbate, oblong-lanceolate to oblong-oval; limbidium ending before apex and pluripapillose cells mainly in apical region. Briocenological group: saxicolous, terricolous, and epixylous.

Brazilian range. GO, MG, PR, RJ, RS, SC, SP (moderate distribution).

****Fissidens yucatanensis* Steere**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041° 41′69″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 335).

Identification. Leaves lanceolate leaves; apex acute, with hyaline or reddish apical cells and unipapillary lamellar cells. This species resembles *Fissidens angustifolius* Sull., and *Fissidens goyazensis* Broth. However, *F. angustifolius* has the costa precurrent, the limbidium not-terminating below the apex, and hyaline apical cells are absent; *F. goyazensis* differs by having the leaves ligulate and the costa precurrent to excurrent. Briocenological group: saxicolous and terricolous.

Brazilian range. CE, PA, PB (restricted distribution). Newly recorded from the Cerrado.

****Fissidens zollingeri* Mont.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 3 Feb. 2017; G.M.G Nascimento leg. (HUESPI 581).

Identification. Cells large, long-rectangular, pellucid in the median region of vaginate lamina; leaves entirely limbate, oblong-lanceolate. This species resembles *F. bryoides* and *F. crispus*. However, *F. bryoides* possesses a percurrent costa and shorter leaves, while the latter possesses a costa that is precurrent or terminating a few cells below the apex and a dentate margin of the apex and dorsal lamina. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AL, AM, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PR, RJ, RO, RR, RS, SC, SE, SP, TO (broadly distributed).

Family Hypnaceae Schimp.

***Vesicularia vesicularis* (Schwägr.) Broth.**

Examined material. BRAZIL • 10 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 901, 902, 906, 918, 922, 932, 937, 1160, 1185, 1320).

Identification. Leaves lanceolate or ovate, concave, flattened when dry; apex acute; costa double and short; lamina cells rhomboid-hexagonal, smooth, quadratic at base. Briocenological group: saxicolous.

Brazilian range. AC, AM, AP, BA, ES, GO, MG, MS, MT, PA, PE, PI, PR, RJ, RO, RR, RS, SC, SP, TO (broadly distributed).

Family Leucobryaceae Schimp.

***Campylopus arctocarpus* (Hornsch.) Mitt.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′ 85″S, 041°41′69″W; 7 Apr. 2017; G.M.G Nascimento leg. (HUESPI 932).

Identification. Gametophytes frequently branched, differing from all other species. This species is similar to *Campylopus filifolius* (Hornsch.) Mitt. in the leaf characters. The transverse section may look quite similar to some specimens of *C. arctocarpus* and *C. filifolius*, as they share the same general structure, ventral stereids, and dorsal ribs. Briocenological group: saxicolous.

Brazilian range. BA, ES, GO, MG, MT, PE, PI, PR, RJ, RS, SC, SP (broadly distributed).

***Campylopus fragilis* (Brid.) Bruch & Schimp.**

Figure 17

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 941).

Identification. Leaves erect, lanceolate; upper part of leaves with involute margin. Costa occupying between ⅓ and ⅔ of leaf width and undifferentiated alar region. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, MG, RJ, SC, SP (moderate distribution and endemic). Newly recorded from the Cerrado.

***Campylopus gardneri* (Müll. Hal.) Mitt.**

Examined material. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, I Cidade; 04°05′70″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1294, 1635) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 19 Apr. 2017; G.M.G Nascimento leg. (HUESPI 969) • 2 specimens; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 971, 1726) • 1 specimen; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1287) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1349) • 1 specimen; Circuito das Águas; 04°05′39″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1290) • 1 specimen; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1341) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1293) • 6 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1278, 1285, 1357, 1600, 1615, 1729).

Identification. This species resembles *Campylopus carolinae* Grout by its small size, leaves ending in a long, hyaline hairpoint, and general morphology. It differs by the presence of ventral hyalocysts viewed in the costa transverse section. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, CE, MG, MT, PA, PE, PI, PR, RJ, RO, RS, TO (broadly distributed).

***Campylopus heterostachys* (Hampe) A. Jaeger**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1298) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1366) • 1 specimen; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1734) • 1 specimen; same locality; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1291) • 1 specimen; same locality; 29 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1334) • 1 specimen; same locality; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1363) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1348) • 6 specimens; Circuito das Águas; 04°05′39″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 163, 973, 1008, 1288, 1296, 1613) • 1 specimen; Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1336).

Identification. Hyalocysts occupying half of costa thickness; alar region usually differentiated, intruding into costa. Briocenological group: corticolous, saxicolous and terricolous.

Brazilian range. BA, CE, ES, GO, MA, MG, MT, PE, PI, PR, RJ, RO, RS, SP (broadly distributed).

***Campylopus julicaulis* Broth.**

Figure 18

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 19 Dec. 2017; G.M.G Nascimento leg. (HUESPI 258).

Identification. Leaves thin and gametophyte tomentose. *Campylopus julicaulis* resembles *C. occultus* Mitt. but does not possess hyaline basal lamella cells. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, MG, PR, RJ, RS, SC, SP (moderate distribution and endemic). Newly recorded from the Cerrado.

****Campylopus pilifer* Brid.**

Figure 19

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 982).

Identification. Commonly identified by the quadratic cells along the margin at the base, the transverse section of the costa, the hyaline apex, and the auriculate base. Briocenological group: terricolous.

Brazilian range. AL, AM, BA, CE, DF, ES, MG, PA, PE, PR, RJ, RO, RS, SP (broadly distributed).

***Campylopus savannarum* (Müll. Hal.) Mitt.**

Examined material. BRAZIL • 3 specimens; Piauí, Piracuruca, Sete Cidades National Park, Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1280, 1354, 1358) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1359) • 2 specimens; Vale das Pedras; 04°05′93″S, 041°41′585″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1286, 1632) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1336) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 11 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1540) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 970) • 1 specimen; III Cidade; 04°05′95″S, 041°41′51″W; 7 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1277) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1721) • 2 specimens; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1281, 1664) • 2 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1355, 1362) • 1 specimen; Trilha da Bananeira; 04°05′95″S, 041°41′51″W; 19 Dec. 2016; G.M.G Nascimento leg. (HUESPI 1334) • 2 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1289, 1353) • 5 specimens; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 975, 1282, 1297, 1365, 1603).

Identification. Basal marginal cells subquadrate to quadrate, frequently wider than long, in several rows; internal cells short-rectangular. Briocenological group: saxicolous and terricolous.

Brazilian range. AM, BA, CE, ES, GO, MA, MG, MS,

MT, PA, PE, PI, PR, RJ, RO, RR, SE, SP, TO (broadly distributed).

***Campylopus surinamensis* Müll. Hal.**

Examined material. BRAZIL • 1 specimen; Trilha Vale das Pedras; 04°05′93″S, 041°41′585″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1633).

Identification. The main distinctive character of *C. surinamensis* is the unusual pattern of disposal of the leaves on the stem, with basal and terminal tufts, and leaves adpressed along the stem. Each of these arrangements exhibit leaves of differing morphology and anatomy. Briocenological group: saxicolous.

Brazilian range. AM, BA, ES, GO, MA, MG, MS, MT, PA, PI, PR, RJ, RO, SC, SP (broadly distributed).

Family Pottiaceae Hampe

***Hyophila involuta* (Hook.) A. Jaeger**

Examined material. BRAZIL • 5 specimens; Piauí, Piracuruca, Sete Cidades National Park, Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 947, 1188, 1195, 1406, 1589) • 2 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1386, 1506) • 3 specimens; I Cidade; 04°05′70″S, 041°40′80″; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1191, 1199, 1385) • 2 specimens; II Cidade; 04°05′85″S, 041°41′69″W; 19 Dec. 2016; G.M.G Nascimento leg. (HUESPI 1404, 1405) • 1 specimen; same locality; 17 Feb. 2017; G.M.G Nascimento leg. (HUESPI 1041) • 2 specimens; same locality; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1410, 1480) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1408) • 1 specimen; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1186) • 8 specimens; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1126, 1184, 1187, 1192, 1193, 1310, 1395, 1679) • 4 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1016, 1301, 1382, 1396) • 2 specimens; Olho D'Água dos Milagres; 04°05′83″S, 04°41′25″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1197, 1235) • 1 specimen; Trilha Nova; 04°05′83″S, 04°41′25″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1409).

Identification. Leaves ovate-lanceolate, strongly twisted; apex subacute or obtuse; margin entire, involute, irregularly toothed near apex. Costa strong, excurrent. Briocenological group: saxicolous and terricolous.

Brazilian range. AL, AM, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RO, RR, RS, SP (broadly distributed).

****Hyophiladelphus agrarius* (Hedw.) R.H. Zander**

New records. BRAZIL • 4 specimens; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 3 Feb. 2017; G.M.G Nascimento leg. (HUESPI 317, 343, 346, 358).

Identification. Leaves with elongate, smooth costa cells on ventral and dorsal surfaces; stereids present above and below guide cells in transverse section. Briocenological group: saxicolous.

Brazilian range. AC, AM, BA, CE, DF, MA, MT, PA, PB, PE, RJ, RN, RO, RS, SE, SP, TO (broadly distributed).

****Plaubelia sprengelii* (Schwägr.) R.H. Zander**

Figure 20

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 919).

Identification. Cells quadrate to rounded on ventral surface; mamillose cells present at apex of leaves. This species is similar to *H. agrarius*, but the presence of mamillose cells at the apex of the leaves differentiates them. Briocenological group: saxicolous.

Brazilian range. AC, AM, RO, BA, MA, PE, GO, MT, MG, RJ, SP (broadly distributed).

***Weisiopsis nigeriana* (Egunyomi & Olar.) R.H. Zander**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Olho D'Água dos Milagres; 04°05′83″S, 04°41′25″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1387).

Identification. This species differs from other species of the genus by the laminal cells, which are bulging on both sides of the lamina, although more strongly on the adaxial side, and by the bulging exothecial cells on the capsule. Briocenological group: saxicolous.

Brazilian range. GO, PI, TO (restricted distribution).

Rhachitheciaceae H. Rob.

***Zanderia octoblepharis* (A. Jaeger) Goffinet.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04° 05′85″S, 041°41′69″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 598) • 1 specimen; same locality; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 996).

Identification. Leaves grouped, crispate when dry, patent when wet, ligulate to oblong, keeled above, obtuse at apex; margins entire, costa strong, ending several cells below apex. Briocenological group: saxicolous.

Brazilian range. AM, BA, GO, MG, PA, PI (moderate distribution and endemic).

Family Sematophyllaceae Broth.

****Sematophllum adnatum* (Michx.) E. Britton**

New records. BRAZIL • 3 specimens; Piauí, Piracuruca, Sete Cidades National Park, Olho D'Água dos Milagres; 04°05′83″S, 04°41′25″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 254, 281, 288) • 1 specimen; same locality; 3 Feb. 2017; G.M.G Nascimento leg. (HUESPI 530).

Identification. Leaves lanceolate, with concave laminae, acuminate apex, and inflated supra-alary cells. Briocenological group: saxicolous, terricolous and epixylous.

Brazilian range. AM, BA, DF, ES, GO, MA, MG, MS, MT, PA, RJ, RN, SP, TO (broadly distributed).

***Taxithelium planum* (Brid.) Mitt.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 922).

Identification. Leaves complanate, with short costa, acute apex, and entire margins. Briocenological group: saxicolous.

Brazilian range. AL, AM, BA, DF, GO, MG, MT, PA, PE, RO, RR, SP (broadly distributed).

***Trichosteleum hornschuchii* A. Jaeger**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, II Cidade; 04°05′85″S, 041°41′69″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1655). **Identification.** Leaves erect, ovate-lanceolate, with acute apex and serrated to entire margin. Briocenological group: saxicolous.

Brazilian range. AM, BA, MA, MG, MT, PA, RJ, SP (moderate distribution).

***Trichosteleum subdemissum* (Schimp. ex Besch.) A. Jaeger**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 591).

Identification. Leaves acute; apex cells shorter than medians; lamina papillae small. Briocenological group: saxicolous and terricolous.

Brazilian range. AM, BA, DF, GO, MA, MG, MT, PA, PI, RJ, RO, RR, SP (broadly distributed).

***Vitalia galipensis* (Müll. Hal.) P.E.A.S. Câmara, Carv.-Silva & W.R. Buck**

Figure 21

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 3 Feb. 2017; G.M.G Nascimento leg. (HUESPI 543).

Identification. Leaves strongly concave, ovoid-lanceolate, with margins entire, costa absent, and apex acuminate; upper and median cells of lamina fusiform, smooth. Briocenological group: corticolous and saxicolous.

Brazilian range. BA, ES, MG, MT, PA, PE, PR, RJ, RO, RR, RS, SC, SP, TO (broadly distributed and endemic).

***Vitalia subsimplex* (Hedw.) Mitt.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, I Cidade; 04°05′70″S, 041°40′80″; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1070) • 2 specimens; II Cidade; 04°05′85″S, 041°41′69″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1061, 1065) • 1 specimen; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1011) • 1 specimen; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 12 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1053) • 5 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 629, 1060, 1074, 1333, 1661) • 1 specimen; Circuito das Águas; 04°05′39″S, 041°40′80″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1073) • 1 specimen; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 12 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1072).

Identification. Stem dark red; branches adhering to the substrate; leaf cells narrow, elongate. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AL, AM, AP, BA, CE, DF, ES, GO, MA, MG, MS, MT, PA, PB, PE, PI, PR, RJ, RO, RR, RS, SC, SE, SP, TO (broadly distributed).

Family Stereophyllaceae W.R. Buck & Ireland

***Entodontopsis leucostega* (Brid.) Buck & Irel.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Olho D'Água dos Milagres; 04°05′83″S, 04°41′25″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1264) • 9 specimens; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 551, 637, 976, 990, 1002, 1092, 1108, 1266, 1271) • 1 specimen; I Cidade; 04°05′70″S, 041°40′80″; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1123) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1319) • 2 specimens; same locality; 11 Jun. 2017; G.M.G Nascimento leg. (HUESPI 597, 1122) • 1 specimen; IV Cidade; 04°06′14″S, 041°41′60″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 979) • 7 specimens; V Cidade; 04°06′016″S, 041°41′607″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 991, 1100, 1111, 1114, 1117, 1118, 1273) • 1 specimen; VI Cidade; 04°05′83″S, 04°41′25″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1268) • 1 specimen; VII Cidade; 04°05′83″S, 04°41′52″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1113) • 4 specimens; Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1096, 1265, 1300, 1507).

Identification. Plants pale to dark green; leaves erect-extended, non-dimorphic, oval-lanceolate to oblong-lanceolate; margin entire or serrated margin near apex; lamina cells smooth. Briocenological group: saxicolous and terricolous.

Brazilian range. AC, AM, BA, CE, DF, GO, MA, MG, MS, MT, PA, PB, PE, PI, RJ, RO, RR, SP, TO (broadly distributed).

***Entodontopsis nitens* (Mitt.) W.R. Buck & Ireland**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão;

04°27′40″S, 041°56′30″W; 3 Feb. 2017; G.M.G Nascimento leg. (HUESPI 502).

Identification. Recognized by long-hexagonal cells of the apex and of the lamina, without papillae and with denticulate margin of median portion. Briocenological group: saxicolous.

Brazilian range. AC, AL, BA, CE, GO, MG, MS, MT, PA, PE, PR, RS, SP (broadly distributed).

***Eulacophyllum cultelliforme* (Sull.) W.R. Buck & Ireland**

New records. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Feb. 2017; G.M.G Nascimento leg. (HUESPI 499, 510) • 2 specimens; same locality; 7 Jul. 2017; G.M.G Nascimento leg. (HUESPI 1101, 1092).

Identification. Leaves obtuse to ovate-oblong, irregularly serrated at apex; costa simple; lamina cells with distinct papillae. Briocenological group: saxicolous and corticolous.

Brazilian range. AM, BA, ES, MG, MS, MT, PB, PE, PR, RJ, SP, TO (broadly distributed).

***Stereophyllum radiculosum* (Hook.) Mitt.**
Figure 22

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′ 40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 726).

Identification. Leaves imbricate, slightly wrinkled when dry, with subprecurrent costa; leaf margin entire. Briocenological group: corticolous and terricolous.

Brazilian range. BA, ES, GO, MG, MS, MT, P A, PR, RS, SC, SP (broadly distributed).

Marchantiophyta

Family Aneuraceae H. Klinggr.

***Riccardia regnelli* K.G. Hell**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 629).

Identification. Gametophytes small (<2 cm), with pinnate, erect thallus. Briocenological group: saxicolous.

Brazilian range. BA, ES, MG, MT, PE, RJ, RN, RS, SC, SP (broadly distributed and endemic).

Family Cephaloziellaceae Douin

***Cylindrocolea planifolia* (Steph.) R.M. Schust.**
Figure 23

New records. BRAZIL • 3 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1004, 1006, 1028).

Identification. Leaves succubous, with rectangular median cells. Briocenological group: saxicolous.

Brazilian range. AC, BA, MG, RJ, RO, SC, SP (moderate distribution). Newly recorded from the Cerrado.

***Cylindrocolea rhizantha* (Mont.) R.M. Schust.**
Figure 24

New records. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 943, 971).

Identification. Leaves succubous, with subquadratic median cells and bifid apex. Briocenological group: saxicolous.

Brazilian range. AC, BA, ES, GO, PE, RJ, SP (moderate distributed).

Family Cyathodiaceae (Grolle) Stotler & Crand.-Stot.

***Cyathodium cavernarum* Kunze**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1214).

Identification. Thallus irregularly, dichotomously branched, not fan-shaped; spore spherical, with baculate surface. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, CE, GO, MG, MS, MT, PE, PI (moderate distributtion).

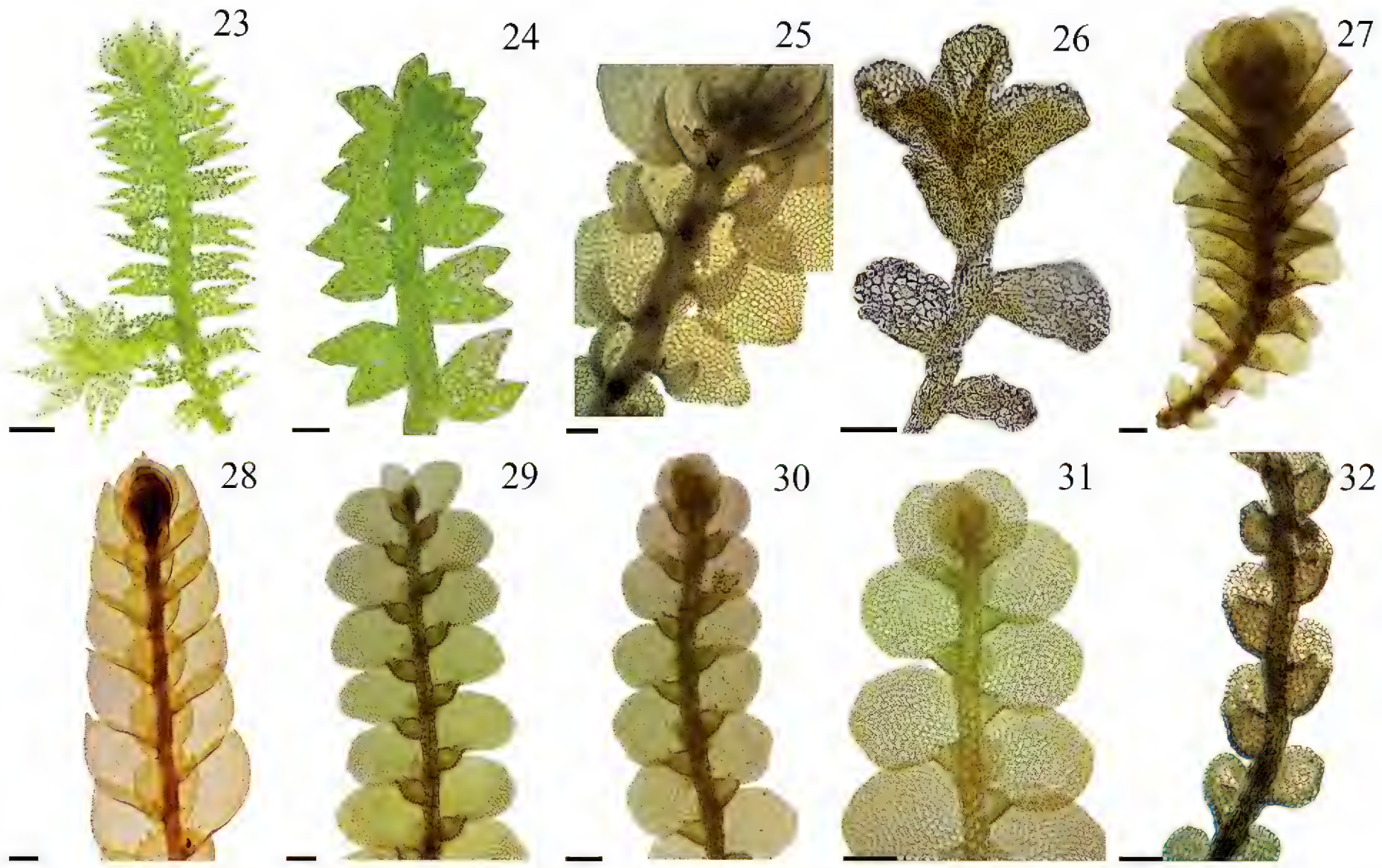
Family Fossombroniaceae Hazsl.

***Fossombronia porphyrorhiza* (Nees) Prosk.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1679) • 1 specimen; same locality; 29 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1004) • 4 specimens; same locality; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1016, 1032, 1301, 1316) • 3 specimens; Trilha Bacuri; 04°05′94″S, 041°42′58″W; 2 Mar. 2017; G.M.G Nascimento leg. (HUESPI 646, 947, 1047) • 1 specimen; II Cidade; 04°05′85″S, 041°41′69″W; 12 Apr. 2017; G.M.G Nascimento leg. (HUESPI 1004) • 2 specimens; same locality; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 927, 929) • 1 specimen; same locality; 8 Jun. 2017 G.M.G Nascimento leg. (HUESPI 964) • 3 specimens; III Cidade ; 04°05′95″S, 041°41′51″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1246, 1249, 1257) • 1 specimen; same locality; 10 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1035).

Identification. Rhizoids purple. Briocenological group: terricolous.

Brazilian range. BA, CE, DF, ES, GO, MA, MG, MS, MT, PE, PI, RJ, SP, TO (broadly distributed).



Figures 23–32. Bryophytes of Sete Cidades. **23.** *Cylindrocolea planifolia* (Steph.) R. M. Schust. **24.** *Cylindrocolea rhizantha* (Mont.) R.M. Schust. **25.** *Frullania platycalyx* Herzog. **26.** *Jungermannia hyalina* Hooker. **27.** *Acrolejeunea torulosa* (Lehm. & Lindenb.) Schiffn. **28.** *Bryopteris diffusa* (Sw.) Nees. **29.** *Ceratolejeunea cornuta* (Lindenb.) Steph. **30.** *Cheilolejeunea aneogyna* (Spruce) A. Evans. **31.** *Cheilolejeunea myriantha* (Nees & Mont.) R.M. Schust. **32.** *Microlejeunea bullata* (Taylor) Steph.

Family Frullaniaceae Lorch.

***Frullania glomerata* (Lehm. & Lindenb.) Mont.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1086).

Identification. Leaves incubous, imbricate, slightly concave, with margin entire. This species possess a foliaceous stylus, as in *Frullania caulisequa* (Nees) Mont., but these species are distinguished by the direction of the lobules in relation to the stem, with the lobules being parallel to the stem in *F. glomerata*. Briocenological group: corticolous.

Brazilian range. BA, CE, DF, ES, GO, MA, MG, MS, MT, PR, RJ, RS, SP (broadly distributed).

***Frullania platycalyx* Herzog**

Figure 25

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 763).

Identification. Leaves incubous, with margin entire and only laminar lobules. Briocenological group: corticolous.

Brazilian range. PA, PR, RJ, RS, SC (moderate distribution). Newly recorded from the Cerrado.

Family Jungermanniaceae Rchb.

***Jungermannia hyalina* Lyel**

Figure 26

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, III Cidade; 04°05′95″S, 041°41′51″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 275).

Identification. Distinguished by the presence of elongate cells, abundant rhizoids, and a slightly undulate margin. Briocenological group: corticolous.

Brazilian range. MG, MS, MT, RJ, RS, SP (moderate distribution).

Family Lejeuneaceae Cavers

***Acrolejeunea torulosa* (Lehm. & Lindenb.) Schiffn.**

Figure 27

New records. BRAZIL • 2 specimens; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 2 Feb. 2017; G.M.G Nascimento leg. (HUESPI 297, 318) • 1 specimen; same locality; 8 Jun. 2017 G.M.G Nascimento (HUESPI 1101).

Identification. Lobules with 5–8 teeth; leaves small, caducous. Briocenological group: saxicolous and corticolous.

Brazilian range. AC, AL, AM, BA, ES, GO, MA, MG, MS, MT, PA, PE, PR, RJ, RO, RR, RS, SP (broadly distributed).

***Bryopteris diffusa* (Sw.) Nees**
Figure 28

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′ 40″S, 041°56′30″W; 7 Jun. 2017; G.M.G Nascimento leg. (HUESPI 868).

Identification. Characterized by false dichotomous branching and by three large teeth in the apical margins of the lobules. Briocenological group: corticolous.

Brazilian range. AL, AM, BA, CE, ES, MG, MT, PA, PB, PE, PR, RJ, RS, SC, SP (broadly distributed).

***Ceratolejeunea cornuta* (Lindenb.) Steph.**
Figure 29

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1000).

Identification. Utricles present at base of branches; lobules spherical. Briocenological group: corticolous.

Brazilian range. AC, AM, AP, BA, CE, MG, PA, PE, PR, RJ, RO, RR, SC, SP (broadly distributed). Newly recorded from the Cerrado.

***Cheilolejeunea aneogyna* (Spruce) A. Evans**
Figure 30

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 1058).

Identification. Teeth of the lobules contiguous; innovations absent. Briocenological group: corticolous.

Brazilian range. AM, PA, RO, BA, PE, MT, ES, SP (moderately distributed). Newly recorded from the Cerrado.

***Cheilolejeunea myriantha* (Nees & Mont.) R.M. Schust.**
Figure 31

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′ 40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 999).

Identification. Leaves with plane lobes, entire margin, hexagonal cells, small trigones, and orbicular underleaves. Briocenological group: saxicolous.

Brazilian range. BA, ES, MG, MT, SP (moderate distributed). Newly recorded from the Cerrado.

***Cyclolejeunea luteola* (Spruce) Grolle**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 1028).

Identification. Ocelli colorless, 1–2 per leaf, located suprabasally and arranged side by side, rarely in a row, generally larger than adjacent cells. This species is often confused with *Prionolejeunea* spp. due to the crenulate or denticulate leaf margins, but in *Prionolejeunea* ocelli are absent. Briocenological group: corticolous.

Brazilian range. AM, BA, MG, MT, PA, PE, RJ, RO, SP (moderate distribution).

***Lejeunea adpressa* Nees**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′ 40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 974).

Identification. Leaves ovoid, with leaf margins entire; underleaves bifid. Briocenological group: corticolous.

Brazilian range. AM, BA, ES, GO, PR, RJ, SP (moderate distribution). Newly recorded from the Cerrado.

***Lejeunea cancellata* Nees & Mont.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 855).

Identification. Leaves contiguous to imbricate, with margin entire, apex rounded, and underleaves with acute to slightly lanceolate lobes. Briocenological group: saxicolous.

Brazilian range. AC, BA, PA, RJ, SP (moderate distribution). Newly recorded from the Cerrado.

***Lejeunea caulicalyx* (Steph.) E. Reiner & Goda**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 941).

Identification. Leaves imbricate, with ovoid lobes with arched, entire anterior margin and straight, entire posterior margin; apex rounded to obtuse; lobules inflated, ovoid, frequently reduced. Briocenological group: corticolous.

Brazilian range. AC, AL, BA, ES, MS, MT, PA, PE, PR, RJ, RR, SP (broadly distributed). Newly recorded from the Cerrado.

***Lejeunea cladogyna* R.M. Schust.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04° 27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 976).

Identification. Gametophytes small, (488–712 µm wide) prostrate; oil bodies smalln finely granulose; ocelli absent; ovule ovoid; margin involute, with short apical tooth. Briocenological group: saxicolous.

Brazilian range. AM, BA, ES, SP (restricted distribution). Newly recorded from the Cerrado.

***Lejeunea oligoclada* Spruce**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°

27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 1036).

Identification. Leaves patent to suberect leaves, with slightly arched, entire, slightly crenulate anterior margins, and straight, crenulate posterior margins; apexes rounded to acute. This species can be confused with *Lejeunea phyllobola* Nees & Mont., but the smaller size of the gametophyte and the finely papillose cuticle in *L. oligoclada* distinguishes these two species. Briocenological group: saxicolous.

Brazilian range. AL, BA, ES, MG, PE, PR, RJ, SC, SP (moderate distribution and endemic). Newly recorded from the Cerrado.

***Microlejeunea bullata* (Taylor) Steph.**

Figure 32

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 1001).

Identification. Gametophytes small (138–220 μm); underleaves small, bifid; anterior margin arched, entire; posterior margin arched, entire, continuous with keel; apex rounded. Briocenological group: corticolous.

Brazilian range. AC, AM, BA, CE, DF, ES, MA, MG, MS, MT, PR, PE, RJ, RN, RO, RS, SC, SE, SP (broadly distributed). Newly recorded from the Cerrado.

***Prionolejeunea scaberula* (Spruce) Zwickel**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 989).

Identification. Dorsal surface rugose; leaf margins denticulate to crenulate. Briocenological group: saxicolous.

Brazilian range. AM, BA, MA, SP (restricted distribution and endemic). Newly recorded from the Cerrado.

Family Metzgeriaceae H. Klinggr.

***Metzgeria dichotoma* (Sw.) Nees**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 996).

Identification. Gametophyte prostrate, thallose, with irregular dichotomous ramifications; numerous bristles present on ventral surface, on alae, on thickening, and margin; discoidal or ovoid gemmae frequently present on dorsal surface with falcate bristles. Briocenological group: saxicolous.

Brazilian range. GO, MG, PE, PR, RJ, RS, SP (moderate distribution). Newly recorded from the Cerrado.

Family Pallaviciniaceae Mig.

****Symphyogyna brongniartii* Mont.**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 981).

Identification. Thallus deeply or shallowly lobate, with simple ramifications and marginal teeth. Briocenological group: saxicolous.

Brazilian range. AC, AM, MG, MS, MT, RJ, RS, SP, SC (moderate distribution). Newly recorded from the Cerrado.

Family Ricciaceae Rchb.

***Riccia erythrocarpa* Jovet-Ast**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, V Cidade; 04°06′016″S, 041°41′607″ W; 17 Jul. 2017; G.M.G Nascimento leg. (HUESPI 1073).

Identification. Dorsal epidermal cells with thickened walls and rounded spores. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, PE (restricted distribution and endemic). Newly recorded from the Cerrado.

***Riccia stenophylla* Spruce**

New records. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, V Cidade; 04°06′016″S, 041°41′607″ W; 8 Jun. 2017; G.M.G Nascimento leg. (HUESPI 830).

Identification. Thallus with very narrow (0.3–0.5 mm) segments. Briocenological group: terricolous.

Brazilian range. BA, CE, ES, GO, MA, MS, MT, PB, PE, PR, RJ, RS, SC, SP (broadly distributed).

***Riccia vitalii* Jovet-Ast**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 578).

Identification. Rounded hyaline cells, forming the epidermis, regularly arranged, of equal size throughout surface; pores not evident. Briocenological group: saxicolous and terricolous.

Brazilian range. AL, AM, BA, CE, ES, GO, MA, MS, PB, PE, PI, RN, RS, SE, TO (broadly distributed).

Family Targioniaceae Dumort.

***Targionia hypophylla* L.**

Examined material. BRAZIL • 1 specimen; Piauí, Piracuruca, Sete Cidades National Park, Cachoeira Riachão; 04°27′40″S, 041°56′30″W; 19 Mar. 2017; G.M.G Nascimento leg. (HUESPI 1245).

Identification. Epidermal cells short, slightly rectangular; thallus broad. Briocenological group: saxicolous and terricolous.

Brazilian range. BA, GO, MG, PI, RS (moderate distribution).

Discussion

The bryophytes found in our study represent approximately 13% of all species recorded from the Northeast Region of Brazil, and 6% of the species known from the country. Our study adds important information on the occurrence, diversity, and distribution of the bryoflora in the Cerrado of Piauí.

The list of species includes seven that are endemic to Brazil: *Campylopus julicaulis*, *Riccardia regnelli*, *Lejeunea oligoclada*, *Prionolejeunea scaberula*, *Riccia erythrocarpa*, *Vitalia galipensis*, and *Zanderia octoblepharis*. According to Costa and Peralta (2015), only one species is endemic to Piauí, but the purported low endemism is more related to the lack of study and gaps in knowledge of the group than to low biodiversity (Forzza 2010). Our data reveal the importance of PN7C for the preservation of endemic species, because the site includes areas of Cerrado and Caatinga, which increases its value as a conservation unit.

The newly recorded species from Piauí represent 58% of the species found in the study. This was expected because, according to Tabarelli and Vicente (2004), the true number of species of different plant groups of the Caatinga and Cerrado remains unknown, given that about 40% of these areas have never been studied and that much of the research has barely explored their biodiversity.

The saxiocolous briocenological group was the most expressive, revealing that bryophytes from Cerrado areas, as well as those from Tropical Forests, are related to vegetation, since they depend on the availability of substrate (Ruinen 1953).

The PN7C region has conditions that favor the development of bryophytic flora. The area is characterized by a chain of rocky outcrops with open, flooded fields and wet forests (IBDF 1979; IBAMA 1989). It is in these habitats that bryophytes are most represented. The biological diversity in PN7C, as well as threats to its conservation, make this area a priority for study.

Fissidentaceae was the most represented moss family in the study area. This family was also found to be highly rich for other areas of Cerrado by Castro et al. (2002), Correia et al. (2015), Carmo and Peralta (2016), Rios et al. (2016), and Nascimento et al. (2019). It is one of the largest families of mosses, occurring in both forests and open areas, from sea level to 4,700 m; it occurs in moist habitats, generally near bodies of water, on soil, rocks, logs, and the base of tree trunks. A few species are aquatic (Pursell 1994, 2007). The wide variety of substrates in which this family occurs is indicative of its representativeness in our study.

The family Lejeuneaceae also had expressive representation in our study, and all of the species found were newly recorded from Piauí. This family was also dominant in the studies by Visnadi (2004), Carmo and Peralta (2016), and Rios et al. (2016). This family has a recent evolutionary origin and an independent diversification process that has resulted in a wide range of morphology and substrate occupation (Groth-Malonek et al. 2004). Germano and Pôrto (1997) remarked that Lejeuneaceae occupies a great ecological range, which is in contrast to other families of liverworts. Morphological and habitat variability may have resulted in the great diversity of the Lejeuneaceae family and is always the richest liverwort family in Neotropical inventories (Groth-Malonek et al. 2004).

Species such as *Bryum leptocladon* and *Weisiopsis nigeriana* (Egunyomi and Olar.) stand out for having restricted distributions in Brazil according to Flora do Brasil (2020). These species were collected on rocks and soil in moist, shaded habitats. We found species having distributions exclusive to a single biome, including *Riccia erythrocarpa*, which only occurs in the Caatinga biome (Jovet-Ast 1991), and *Fissidens prionodes* which has only been reported from the Amazon biome (Bordin and Yano 2013). In addition, 10 of the species that we recorded were previously cited only from the Atlantic Forest but are now reported from the Cerrado.

Our results fill distribution gaps and add important new information on the diversity and occurrence of bryophyte species in Sete Cidades National Park and the Cerrado. In addition, we show that there were a large number of Brazilian endemic species which had not yet been recorded from the Cerrado. Sete Cidades National Park is important for the conservation of Brazil's bryophyte flora.

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Authors' Contributions

GMGN collected the data, wrote the text, and identified the bryological material; GMC reviewed the text; DFP confirmed the identifications and reviewed the text; HCO confirmed the identifications and reviewed the text.

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